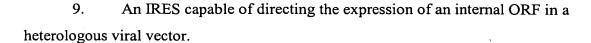
WHAT IS CLAIMED IS:



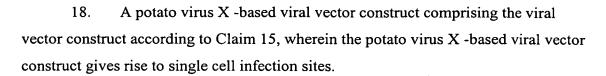
- 1. A polynucleotide comprising: (1) an IRES nucleotide sequence, (2) an ORF encoding a peptide of interest, and (3) an ORF encoding a viral protein, where (1) is located between (2) and (3).
- 2. The polynucleotide according to Claim 1 wherein a promoter 5' to (1), (2) and (3) transcribes a mRNA containing (1), (2) and (3).
- 3. The polynucleotide according to Claim 2 wherein the IRES nucleotide sequence is a naturally occurring IRES or a fragment of a naturally occurring IRES that can direct translation of (2) or (3).
- 4. The polynucleotide according to Claim 2 wherein the IRES sequence comprises a nucleotide sequence of SEQ ID NO: 1; SEQ ID NO: 2; SEQ ID NO: 3; SEQ ID NO: 4; SEQ ID NO: 5; SEQ ID NO: 6; SEQ ID NO: 7; or a fragment of SEQ ID NO: 1, SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7, that can direct translation of (2) or (3).
- 5. The polynucleotide according to Claim 2 wherein the viral protein is a coat protein.
- 6. A recombinant viral vector comprising a polynucleotide according to Claim 1.
- 7. A recombinant virus comprising a recombinant viral vector according to Claim 5.



8. A host comprising a recombinant virus according to Claim 6.



- 10. An IRES according to Claim 9 wherein the IRES is a IREScp.
- 11. An IRES according to Claim 10 wherein the IRES is crTMV IREScp.
- 12. A viral vector construct that expresses a bicistronic mRNA comprising an ORF positioned upstream of an IRES sequence and followed by a coat protein coding sequence.
- 13. A viral vector construct according to Claim 12 wherein the ORF encodes a native or foreign gene.
- 14. A viral vector construct according to Claim 13 wherein the reporter gene encodes a green fluorescent protein.
- 15. A viral vector construct, comprising: (1) a viral genome, and (2) an IRES sequence, wherein the IRES sequence is heterologous to the viral genome, wherein the IRES sequence is downstream of a desired gene or ORF and upstream of a virus coat protein gene, wherein the IRES sequence is in the sense or antisense orientation.
- 16. A viral vector construct according to Claim 15 wherein the viral vector construct expresses a bicistronic mRNA.
- 17. A viral vector construct according to Claim 15 wherein the viral genome is the genome of potato virus X.





- 19. A viral vector construct according to Claim 15 further comprising (3) a stable stem loop structure inserted 5' of the IRES sequence.
- 20. A viral vector construct according to Claim 19 wherein the stem loop structure is immediately upstream of the IRES sequence.
- 21. A viral vector construct according to Claim 20 wherein the stem loop structure causes a reduction in the expression of the virus coat protein gene.
- 22. A viral vector construct according to Claim 21 wherein the stem loop structure interferes with direct interaction of a ribosome at the IRES sequence.
- 23. A viral vector construct according to Claim 15 further comprising (3) a stable stem loop structure inserted 3' of the IRES sequence.
- 24. A viral vector construct according to Claim 23 wherein the stem loop structure prevents expression of the virus coat protein gene.
- 25. A viral vector construct according to Claim 23 wherein the stem loop structure effectively blocks scanning ribosomes.



26. A viral vector comprising a plant virus-derived IRES sequence linked to the ORF encoding a protein of interest, wherein the plant virus-derived IRES sequence directs translation of the ORF and wherein the protein of interest is heterologous to the viral vector.



- 27. A viral vector according to Claim 26 wherein the plant virus-derived IRES sequence initiates translation effectively in either sense or antisense orientation.
- 28. A viral vector according to Claim 27 wherein the plant virus-derived IRES sequence is an IREScp sequence.
- 29. A viral vector construct comprising the function of producing a bicistronic subgenomic RNA in which two ORFs are separated by an IRES.



- 30. A viral vector construct comprising a modified IRES sequence that directs higher levels of protein expression.
- 31. A nucleic acid construct comprising a bicistronic message with an intervening IRES sequence.
- 32. A transgenic virus comprising the nucleic acid construct according to Claim 31.
 - 33. A transgenic virus comprising a foreign IRES.
- 34. A method of regulating the rate at which a virus infection spreads in a host, comprising: placing a nucleic acid construct comprising an internal ribosomes entry site upstream of a coat protein gene, wherein the internal ribosome entry site is chosen by the rate of infection of the viral vector on a host in the presence of that IRES.
- 35. A method of directing the expression of a foreign nucleic acid sequence in a host in the absence of multiple subgenomic promoters in a virus, comprising: placing a nucleic acid construct comprising an internal ribosomes entry site upstream of a foreign gene.



- 36. A method of directing the expression of a foreign ORF in a host, comprising:
- (a) inserting a nucleic acid construct comprising a bicistronic message with an intervening IRES into a virus;
 - (b) infecting a host with the virus; and
 - (c) growing the host;

whereby the foreign ORF is expressed.

- 37. A potato virus X-based viral vector construct having the designation TXS.GFPΔCP.
 - 38. A polynucleotide comprising pIRESs-XCP.
 - 39. A polynucleotide comprising pIR ES-XCP.
 - 40. A polynucleotide comprising pSERI-XCP.
 - 41. A polynucleotide comprising pHIRES-XCP.
 - 42. A polynucleotide comprising pTXS.GFP.IRES-CP.
 - 43. A polynucleotide comprising parts.GFP.IRESs-CP.
 - 44. A polynucleotide comprising pTXS.GFP.SERI-CP.
 - 45. A polynucleotide/comprising pTXS.GFP.HIRES-CP.
 - 46. A polynucleotide comprising pTXS.GFP.IRESH-CP.
 - 47. A polynucle otide comprising pTXS.GFP-IRESs(mp)-CP.

- 48. A viral vector construct comprising TXS.GPF-IRES-CP.
- 49. A viral vector construct comprising TXS.GPF-IRESs-CP.
- 50. A viral vector construct comprising TXS.GPF-HIRES-CP.
- 51. A viral vector construct comprising TXS GPF-IRESH-CP.
- 52. A viral vector construct comprising TXS.GPF-SERI-CP.

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